PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Differences in beliefs about COVID-19 by gun ownership: A cross-sectional survey of Texas adults
AUTHORS	Johnson, Renee M.; Crifasi, Cassandra; Goodell, Erin; Wisniowski, Arkadiusz; Sakshaug, Joseph; Thrul, Johannes; Owens, Mark

VERSION 1 – REVIEW

REVIEWER	Fleegler, Eric Children's Hospital Boston, emergency medicine
REVIEW RETURNED	05-Apr-2021

GENERAL COMMENTS	Overall this is a very interesting study and its very compelling to see the data that gun ownership is not as predictive of attitudes towards COVID and precautions as one might have expected. Title: Intriguing, clear. Summary: Clear Abstract: relatively clear. In methods I think you want “adjusted for” not just “adjusting” Intro: overall thoughtful if a little long update deaths in 2nd sentence and reference it to the US specifically. 2nd paragraph – Texas is not the largest state in the US – it is the 2nd largest by size after Alaska and the 2nd largest by population after California (but I still abide by “don’t mess with Texas”) “Demands to reopen the government” – I’m confused by this- the government was shut down? Last sentence of paragraph 3 – the all-time high monthly gun background checks had been 6/2020 but are now 700,000 higher as of 3/2021 https://www.fbi.gov/file-repository/nics_firearm_checks_-_month_year.pdf/view Methods Though it is convenient to lump together races as white vs. other, it does minimize the ability for readers to understand the populations that were included in the study and their opinions and gun access. Please include the data broken down by all of the races even if ultimately they were lumped together in the multivariable regressions.

	That's a very robust statistical analysis- even with an MPH it was written at a level that was a reach for me. I think it's fine to have this level of detail but I expect it will go beyond most readers ability to understand. Results Well written, clear Since you only have male and female do not call this 'gender balanced' but rather 'sex balanced' – gender refers to socially constructed roles, behaviors, expressions, whereas sex more blandly refer to the biological attributes. Typically, don't capitalize the n in "non-Hispanic". I think after running dozens of tests and exposing the potential for findings by chance, calling the finding of household gun 1.27 times more likely to agree that the threat was 'blown out of proportion, when your confidence interval crosses 1, is a real stretch. The notion of 'marginal' findings should not be used. Discussion: Clear. The 2nd paragraph has the line "the study suggests that Texas adults with household guns are more likely to downplay the threat of covid -19 than those without guns. Your report of the univariate data says these numbers were 39.8% vs. 34.3% - is this really that strong of a take home message, especially in light of the not statistically positive results as discussed above? Limitations- very nicely written and clear Table 1- I find this very confusing- I'm not sure why in the yes/no category of gun ownership you have the columns add up to 100% vs. the rows. It would make far more sense to show that 36% of Hispanic/Latino, 28% of Black NH, 59% of White NH and 34% of "all other" are gun owners, not the distribution as currently listed. This holds true for all of the sections. Additionally, please list out the races included in the "all other" Table 2 and 3 and 4 clear Figure- I'm not sure what is the meaning of the dotted line- there is a lot of information on this figure - does it really help move the story forward beyond the data in the tables?

REVIEWER	Johnson, Timothy University of Illinois, public administration
REVIEW RETURNED	31-May-2021

GENERAL COMMENTS	This brief manuscript reports original data collected using probability RDD and non-probability online samples, which were combined for analyses designed to investigate associations between gun ownership and beliefs about the COVID-19 pandemic. Certainly, information regarding factors associated with willingness to accept COVID-19 safety precautions is important and gun ownership is no exception. It is too bad the surveys did

	not investigate beliefs and behaviors regarding gun safety as these may be more strongly correlated with COVID-19 safety beliefs than gun ownership per se. As the authors observe, the data being examined were collected very early in the pandemic timeline, well before mass resistance to social distancing and other COVID-related safety policies began to spike. The associations reported in this paper, and the take-away messages, might be very different if the data were collected later in 2020 or in 2021. Also, an important limitation not directly addressed is nonresponse error, as the response rates to both data collection efforts were quite low, although similar to most other general population survey efforts being conducted these days. The authors might be encouraged to reflect on the potential effects of nonresponse bias on their main variables of interest. Nonetheless, the paper is professionally prepared, and a reasonable set of analyses are presented to compensate for the probability/non-probability nature of the data.

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

9. Overall this is a very interesting study and it's very compelling to see the data that gun ownership is not as predictive of attitudes towards COVID and precautions as one might have expected. (1) Title: Intriguing, clear. (2) Summary: Clear. (3) Abstract: relatively clear. In methods I think you want "adjusted for" not just "adjusting". We appreciate this feedback. In this revision, we have modified the title as per the Journal's specifications, improved the clarity of the abstract based on editors' comments, and corrected the error you noted in the Methods section of the Abstract.

10. Intro: overall thoughtful if a little long. Update deaths in 2nd sentence and reference it to the US specifically. 2nd paragraph – Texas is not the largest state in the US – it is the 2nd largest by size after Alaska and the 2nd largest by population after California (but I still abide by "don't mess with Texas"). We agree it was a little long, and reviewed it to ensure efficiency in terms of words. We tried to characterize the American cultural landscape of guns and COVID without including unnecessary information. In response to your comments, we have updated number of deaths in the US and we corrected the information about Texas.

11. Intro: "Demands to reopen the government" – I'm confused by this – the government was shut down? We have changed the wording to say "demands for reopening" given that the focus was on government and public buildings, schools, and other non-essential businesses. The government was not shut down.

12. Intro: Last sentence of paragraph 3 – the all-time high monthly gun background checks had been 6/2020 but are now 700,000 higher as of 3/21, https://www.fbi.gov/file-repository/nics_firearm_checks-month_year.pdf/view. Thank you for bringing this to our attention. We deleted the text about the June 2020 estimate being an all-time high.

13. Methods: Though it is convenient to lump together races as white vs. other, it does minimize the ability for readers to understand the populations that were included in the study and their opinions and gun access. Please include the data broken down by all of the races even if ultimately they were lumped together in the multivariable regressions. In Table 1 we provide a descriptive summary of gun ownership by race/ethnicity. Given the low numbers of Black (n=38) and 'all other' (n=33) respondents reporting gun ownership, we are not permitted to present findings by race/ethnicity to preserve respondents' privacy.

14. That's a very robust statistical analysis - even with an MPH it was written at a level that was a reach for me. I think it's fine to have this level of detail but I expect it will go beyond most readers' ability to understand. We used a complex method to enhance the methodological rigor. We edited this

section to ensure it was as clear as possible to the average reader, and also detailed enough for readers who want to use the method. We believe the Bayesian data integration could become a more common way for researchers to strengthen the findings of studies that are based on non-probability samples.
15. Results. Well written, clear. Since you only have male and female do not call this 'gender balanced' but rather 'sex balanced' – gender refers to socially constructed roles, behaviors, expressions, whereas sex more blandly refer to the biological attributes. Typically, don't capitalize the n in "non-Hispanic". We have replaced gender-balanced with sex-balanced, and changed 'Non-Hispanic' to 'non-Hispanic.'

16. Results. I think after running dozens of tests and exposing the potential for findings by chance, calling the finding of household gun 1.27 times more likely to agree that the threat was 'blown out of proportion, when your confidence interval crosses 1, is a real stretch. The notion of 'marginal' findings should not be used. We revised our interpretation and have removed the term 'marginal.' Although we agree that marginal is overused in characterizing findings that are not statistically significant, this finding truly is on the edge of statistical significance. Wasserstein et al., (2018, https://doi.org/10.1080/00031305.2019.1583913) recommends that one should interpret interval estimates by considering the effect size and compatibility with the data under a given model, not just by whether they contain 1. Were we to use a different standard for estimating confidence intervals (e.g., 90%), the interval estimate (0.99 to 1.63) would not include 1. Second, adhering to the Neymann and Pearson testing approach, the hypothesis could be one-sided and the null that OR=1 would be rejected with $p<0.05$ in favor that OR>1. Finally, the purpose of the linear regression was to generate measures of association that better approximate what findings would look like if the entire sample were a probability sample. The parameter estimate from the linear regression was 0.18 and 95% credible interval estimates were 0.07-0.29; this indicates that, for each 1-unit change in agreement (i.e., from strongly disagree to disagree, from disagree to neutral, from neutral to agree, and from agree to strongly agree), the odds of gun ownership increase by 0.18, give or take 0.10 units. The exponent of the parameter estimate of 0.18 is 1.20, which is similar to the OR from the logistic regression. Taken together, the suggestive finding from the logistic regression and the statistically significant finding from the linear regression suggests there is an association.

17. Discussion: Clear. The 2nd paragraph has the line "the study suggests that Texas adults with household guns are more likely to downplay the threat of covid-19 than those without guns. Your report of the univariate data says these numbers were 39.8% vs. 34.3% - is this really that strong of a take home message, especially in light of the not statistically positive results as discussed above? Limitations- very nicely written and clear. The second paragraph of the Discussion makes the important point that Texas adults with versus without guns are not as different from one another as would be expected given the polarization shown in the media. We softened the tone of the sentence you are referring to; it now reads: "this study offers evidence that Texas adults with household guns may be slightly more likely to downplay the threat of COVID-19 than those without guns." The statistical significance of differences in discussed more in the response to #16 above.

18. Tables. Table 1- I find this very confusing- I'm not sure why in the yes/no category of gun ownership you have the columns add up to 100% vs. the rows. It would make far more sense to show that 36% of Hispanic/Latino, 28% of Black NH, 59% of White NH and 34% of "all other" are gun owners, not the distribution as currently listed. This holds true for all of the sections. Additionally, please list out the races included in the "all other". Table 2 and 3 and 4 clear. We carefully reviewed Table 1 and edited for clarity. Minor edits were made to Tables 2-4. For Table 1, the header column includes row percentages for gun in household (yes and no) that sum to 100%. The reader needs to know the row percentages to set the stage for future results. All other results are column percentages, which allows the reader to compare percentages for those with and without guns. We describe the races in the "all other" group in a note below the table and in the text. We now include the following

note below Table 1 to clarify how to read the table: “Note. Values are weighted percentage (unweighted n); values may not sum to total due to missing data. Percentages sum to 100% by column, except for the header row (i.e., percentage with and without household guns), which sums to 100% by row. Respondents in the “all other” race/ethnicity group were Asian, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, more than one race, or were not in any of the race groups listed on the survey.”

19. Figure- I’m not sure what is the meaning of the dotted line- there is a lot of information on this figure - does it really help move the story forward beyond the data in the tables? Upon reflection, we do not believe it helps move the story forward, so we have deleted the Figure.

Reviewer: 2

20. This brief manuscript reports original data collected using probability RDD and non-probability online samples, which were combined for analyses designed to investigate associations between gun ownership and beliefs about the COVID-19 pandemic. Certainly, information regarding factors associated with willingness to accept COVID-19 safety precautions is important and gun ownership is no exception. It is too bad the surveys did not investigate beliefs and behaviors regarding gun safety as these may be more strongly correlated with COVID-19 safety beliefs than gun ownership per se. We agree that it is unfortunate that we were unable to explore perceptions in association with gun safety behaviors. We will consider this idea for future work. We hope it is okay to add that the concept of “gun safety” is complex and nuanced, with many gun owners believing that keeping a gun stored unlocked and loaded is the safest way to be able to respond to a home invasion, whereas health professionals recommend that the safest way to store a gun to prevent injury is locked up and unloaded.

21. As the authors observe, the data being examined were collected very early in the pandemic timeline, well before mass resistance to social distancing and other COVID-related safety policies began to spike. The associations reported in this paper, and the take-away messages, might be very different if the data were collected later in 2020 or in 2021. We are glad to hear that it was clear that our work is most relevant to the emergence of the pandemic, and we agree that much has changed since this study was conducted. We believe that this work makes important contributions, including: [a] presentation of a method for sensitivity analysis of non-probability samples, and [b] the finding that gun owners and those without guns are not as different from one another as it appears from the media.

22. Also, an important limitation not directly addressed is nonresponse error, as the response rates to both data collection efforts were quite low, although similar to most other general population survey efforts being conducted these days. The authors might be encouraged to reflect on the potential effects of nonresponse bias on their main variables of interest. Nonetheless, the paper is professionally prepared, and a reasonable set of analyses are presented to compensate for the probability/non-probability nature of the data. We agree, and have noted that the low response rate in the RDD sample is a limitation of the study. We also used sample weights to adjust for non-response error in both samples, and this is noted in the manuscript. Here is the revised section: We used random-digit-dial sampling and non-probability sampling, which allowed us to rapidly gather information about this emerging health issue. However, both modes of samples are subject to bias. As with most general population survey efforts these days, we had a low response rate for the probability sample, which increases the likelihood of nonresponse error. We do not have information about those who did not participate, although the literature suggest that they are likely to be younger than survey respondents. Older adults are more likely to have household guns, but are also more inclined to believe that COVID-19 is a serious illness and that precautions should be taken. It is

therefore likely that our results are conservatively biased, i.e., biased toward the null. To address the limitations of non-probability sampling, we applied innovative strategies for sensitivity analyses to strengthen conclusions.[16,17] Additionally, we adjusted for nonresponse in both samples by using sample weights based on several socio-demographic characteristics (i.e., sex, race/ethnicity, age, and educational attainment), a standard procedure for addressing nonresponse in surveys.

VERSION 2 – REVIEW

REVIEWER	Fleegler, Eric Children's Hospital Boston, emergency medicine
REVIEW RETURNED	27-Aug-2021

GENERAL COMMENTS	The edits and responses to the prior review are adequate and well done. thank you